



Illinois Department of Natural Resources

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Pat Quinn, Governor
Marc Miller, Director

June 20, 2012

Mr. Chris Henkel, Zoning Officer
Lee County Zoning Department
112 E. Second Street
Dixon, IL 61021

RE: **Green River Wind Farm Phase I LLC, Lee County
Endangered Species Consultation Program
EcoCAT Database Review #1111193; 1111196**

Dear Mr. Henkel:

The Department has received this project for consultation, pursuant to the *Illinois Endangered Species Protection Act* [520 ILCS 10/11], the *Illinois Natural Areas Preservation Act* [525 ILCS 30/17], and Title 17 *Illinois Administrative Code* Part 1075.

Green River Wind Farm Phase I LLC [hereafter GRWF] proposes a commercial wind energy generation project in southwestern Lee County, comprising approximately 60 wind turbines. Collection power lines will be located underground, and each turbine will be served by an access road. Soils in the project area consist largely of sandy and friable loamy soils, most of which are tilled. Some remain in pasture or open woodlands. Several properties owned by the Department of Natural Resources are in the vicinity. The project area is drained by the Green River and its tributaries.

It is the biological opinion of the Department the project is likely to adversely modify environmental conditions within the **Foley Sand Prairie Nature Preserve**, and also likely to adversely modify habitats within the **Sand Prairie Habitat Area INAI Site** and the **Green River Prairie & Wetlands INAI Site**, IDNR-owned and managed areas in Lee County. It is the biological opinion of the Department the proposed action is unlikely to adversely modify environmental conditions within the **Dickenson INAI Site**, the **East Grove INAI Site**, and the **Ryan Wetlands & Sand Prairie INAI Site**.

It is the biological opinion of the Department the proposed action is likely to adversely modify the essential habitat of the state-listed **Ornate Box Turtle**, **Plains Hognose Snake**, **Regal Fritillary Butterfly**, **Blanding's Turtle**, **Yellow Mud Turtle**, **Loggerhead Shrike**, and **Short-eared Owl**, and may adversely modify essential habitat for the **Northern Harrier**.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the essential habitat of the state-listed **Yellow-Headed Blackbird, Black-Crowned Night Heron, Least Bittern, Common Moorhen, Starhead Topminnow, Tubercled Orchid, Broomrape, Daisy-Leaf Grape Fern, and Dwarf Grape Fern.**

The Department recommends the applicant seek an Incidental Take Authorization from the Department for the **Ornate Box Turtle, the Plains Hognose Snake, the Blanding's Turtle, the Yellow Mud Turtle, and the Regal Fritillary** to address liability for prohibited taking of these species.

The Department's opinions are further explained below, with recommendations to the County on measures to avoid or minimize adverse effects, where applicable.

Foley Sand Prairie Nature Preserve and Illinois Natural Areas Inventory (INAI) Site. This 15-acre IDNR-owned dedicated Illinois Nature Preserve is located in the southwest corner of Section 7, Hamilton Township. It is documented to support two State-listed turtles and a State-listed butterfly. It likely also supports an additional State-listed turtle and a State-listed snake.

The Department of Natural Resources and the Illinois Nature Preserves Commission have a duty to preserve and to restore or enhance the environmental conditions within a dedicated Nature Preserve. It is also the mandated policy of all state agencies and units of local government to evaluate the potential for adverse effects and "if the proposed action is found likely to have an adverse impact on a natural area, the agency shall study the proposed action to determine possible methods of eliminating or mitigating the adverse impact. Before implementing any action, the agency shall attempt to mitigate or eliminate any adverse impacts in a manner consistent with the planned action." [525 ILCS 30/17]

It is the Department's opinion the proposed action is likely to adversely modify conditions within the Foley Sand Prairie Nature Preserve.

The wind farm proposal before the County Board includes three turbines (T28, T31, and T33) which are likely to adversely modify environmental conditions within the Nature Preserve through impacts related to visibility, shadow-flicker, noise, vibration, and night illumination. Based on the layout provided to IDNR for review, these turbines are located in the South Quarter of Section 7 (T28, approximately 700 feet from the Preserve), the Northeast Quarter of Section 18 (T31, at approximately 2,100 feet), and the Northwest Quarter of Section 17 (T33, at approximately 4,100 feet).

Each of the effects related to wind turbines abates with increasing distance but, because no threshold disturbance values have been established for any of these parameters, even a low level of impact may be significant.

One of the important values of Illinois Nature Preserves is the ability of human visitors to visualize conditions prior to European settlement. Due to the diverse array of locations and settings of Nature Preserves, they are not equal in this respect; some Preserves have a very high visualization value, while others have a relatively low value.

At Foley Sand Prairie, the visualization value has already been compromised to a slight degree by the turbines of the Big Sky wind farm, 7.5 miles-distant to the southeast. GRWF proposes no fewer than 15

turbines in Lee County within three miles of the Nature Preserve, on a narrow axis extending toward the southeast. The Department acknowledges that, given the local terrain, it is impossible to erect a wind farm in Hamilton Township so that turbines are not visible from within the Nature Preserve. But the nearer turbines will be impossible to ignore and the visualization value of the Nature Preserve will be reduced nearly to zero. Attempting to screen the Preserve, perhaps through planting vegetation at strategic points to block the view, is impractical due to topographical relief within the Preserve. A screen planted near enough to matter would also likely alter or impair the ecological values of the Preserve.

The three nearest turbines have the potential to cast shadow-flicker on the Nature Preserve for various lengths of time in the mornings, each at a different time of the year. This effect is typically considered only as a potential nuisance to human beings residing or working in the vicinity of a turbine during daylight hours, but it may also interfere with the activities of animals, producing abnormal stress. Flicker, typically considered a product of sunlight, may also be produced at night by moonlight, which is of less concern to human beings, but is of potentially equal or greater ecological importance to wildlife, much of which is active nocturnally.

The effects of flicker on wildlife have not been specifically investigated, but the potential for adverse modification of essential habitat for several State-listed endangered or threatened species is described elsewhere in this document. Inside a Nature Preserve, such effects may degrade or alter the ecological balance and integrity of the Preserve in unanticipated ways. The Department believes shadow-flicker is impermissible within a Nature Preserve unless it can be clearly shown to not adversely modify environmental conditions within the Preserve.

Noise is another attribute of wind turbines typically considered and regulated only in the context of its potential effects on humans. Turbines in the locations proposed by GRWF may satisfy Illinois Pollution Control Board standards for noise pollution in the Preserve, but IPCB standards were developed to protect the human environment, not wildlife or the ecological balance of a Nature Preserve. Consequently, it cannot be assumed compliance with IPCB standards will avoid adverse modification of conditions within the Nature Preserve.

Recent scientific research¹ has clearly shown that anthropogenic noise at relatively low levels alters the behavior of animals in ways which ultimately affect the distribution and reproductive success of plants, as well. Many animals are far more sensitive to (and dependent upon) acoustic stimuli than are people. Regulatory standards which control effects to humans are scarcely relevant to questions of effects on animal behavior. Much anthropogenic noise, such as that associated with vehicles and farm equipment, is transient and intermittent. Turbine noise is constant and covers different frequencies and their harmonics.

Potential adverse effects of anthropogenic noise to endangered or threatened species are discussed elsewhere in this document. Noise can alter the relationships between prey and predators; it can shift the level of seed predation or herbivory; and it can alter the levels of metabolic stress in individual animals resulting in poorer health and altered behavior. It is important to prevent or limit the introduction of new levels of anthropogenic noise in a Nature Preserve.

¹Francis, et al.; Noise Pollution Alters Ecological Services: Enhanced Pollination and Disrupted Seed Dispersal; Proceedings of the Royal Society B: Biological Sciences; March 21, 2012.

The distance and intensity at which noise is experienced is affected by a number of transitory physical variables such as temperature, relative humidity, barometric pressure, cloud cover, land-forms, and ground cover, among others. Sensitivity to such noise, even in a single organism, is also variable, changing with the timing of activities or reproductive cycles. Hence, it is difficult or impossible to establish a threshold above zero for new noise, by either frequency or intensity, which would guarantee that adverse effects within a Nature Preserve are avoided.

The Department acknowledges the existence of adjacent roads, railways, and farm fields. These uses and activities—and their adverse impacts—predate the dedication of the site as a Nature Preserve, and represent the *status quo ante*. The Department must work within any limitations they impose. This is not the case with new and significant sources of noise, such as wind turbines.

Another attribute of wind turbines is that of ground vibrations. Research has verified that wind turbines generate micro-seismic vibrations proportional to wind-speed and blade-passing frequencies which, depending on geological conditions, can be easily detected with instruments as far as six miles away.² The Department is unaware of any research specifically linking the effects of vibrations generated by wind turbines to animal behavior. However, most animals are equipped, through auditory or tactile organs, to detect and respond to the acoustic energy transmitted by vibrations.

Many soil organisms and other animals are much more sensitive to vibrations than are humans. Animals which spend most of their time on or below the ground surface may alter their behavior in response to ground vibrations from turbines in the vicinity. Again, no thresholds of effect on animal behavior related to wind turbines have been established. A conservative approach calls for vibrations from wind turbines to be avoided or minimized within a Nature Preserve.

Intermittent aviation warning lights on nearby turbines will illuminate the Preserve at night, especially under overcast skies. This may adversely affect nocturnal wildlife within the Preserve by altering relationships between predators and prey. Illumination of the Preserve should be avoided, if possible.

The Department notes that, while adverse effects to endangered or threatened species within Foley Nature Preserve may appear to be addressed by seeking an Incidental Take Authorization under the *Illinois Endangered Species Protection Act*, such an Authorization cannot include alteration of habitat within a dedicated Illinois Nature Preserve, wherein all species are equally protected and may be disturbed only for purposes of scientific research or Preserve management. The relationships and ecosystems within the Preserve are themselves protected, not just the individual plants and animals.

Recommendation #1: The County should consider a minimum one mile buffer around Foley Nature Preserve to reduce or avoid the adverse effects of visibility, shadow-flicker, noise, vibration, and illumination from nearby wind turbines. A distance of one mile, while arbitrary, may be insufficient to fully avoid all adverse effects. Based on the information provided to the Department, such a requirement would affect three proposed wind turbine locations.

² Styles, et al.; Microseismic and Infrasound Monitoring of Low Frequency Noise and Vibrations from Windfarms; Keele University; Staffordshire, UK; July 2005.

Recommendation #2: The County should consider a requirement to perform shadow-flicker modeling for turbines proposed within a 1.5 mile radius of Foley Nature Preserve. If the model demonstrates flicker will occur within the Preserve, the turbine responsible should be relocated to a suitable distance to avoid all flicker effects within the Preserve, or the turbine should be immobilized during those periods when flicker within the Preserve can be expected. Such a requirement would apply to five proposed turbines, including the three addressed above.

Recommendation #3: The County should consider a requirement to deploy an FAA-approved Audio-Visual Warning System to minimize nocturnal illumination of Foley Nature Preserve.

Green River Prairie & Wetlands Illinois Natural Areas Inventory (INAI) Site. This INAI Site consists of 1,137 acres comprising five discrete areas within the boundaries of the 2,560-acre Green River State Fish & Wildlife Area (GRSFWA). This INAI Site is the largest remaining remnant of the Great Winnebago Marsh which once covered hundreds of square miles. It contains diverse ecosystems ranging from dry gravel prairies to marshes and bogs. Plant inventories have identified more than 500 species at this Site: 488 vascular plants, 28 mosses, and 21 lichens. Among these are 44 species reported from nowhere else in Lee County. It provides essential habitat for State-listed endangered or threatened species: five birds, three turtles, three plants, a snake, and a butterfly, each addressed elsewhere in this document. Green River SFWA is managed primarily for hunting and fishing. Acquired with federal funding in the 1940's, the Department has nearly seven decades of conservation effort invested in this unique property.

It is the Department's opinion the proposed action is likely to adversely modify the Green River Prairie & Wetlands INAI Site.

The turbine layout provided for the Department's review shows eighteen wind turbines located within one mile of the GRSFWA.³ Five of these are within one-half mile of INAI Site boundaries within GRSFWA.⁴

The Department believes turbines within one mile of GRSFWA will register impacts within the GRSFWA stemming from visibility, flicker, noise, vibration and intermittent illumination. Again, the severity of effects is generally related to distance, so that effects from turbines within one-half mile are expected to be greater than from those more distant. Such effects on State-listed species may rise to the level of a prohibited "take" in some circumstances; these are discussed relative to each species elsewhere in this document. The INAI areas within GRSFWA are not registered as Land & Water Reserves or dedicated as State Nature Preserves, yet still warrant consideration by the County of measures to avoid or minimize adverse effects within them.

Many animals move in and out of the GRSFWA during seasonal movements. Green River SFWA is crossed by a one-mile segment of Pump Factory Road, and is bounded by segments of Union Road, Maytown Road, and Atkinson Road. A 2011 survey conducted between May and October of 6.4 miles of road near, within, and adjacent GRSFWA tallied 114 snakes of six species, 63 of which (55%) were found dead on the road, killed by vehicles under normal traffic conditions. Though none of these 2011 observations included any State-listed species, Plains Hognose Snakes have been road-killed as recently

³ T54-T60; T61, T63, T65, T71, T74, T76, T77, T78, T80, T81, T85.

⁴ T58, T61, T71, T74, T76.

as 2008 along this route. Wind Farm construction results in thousands of additional vehicle trips, which could be severely detrimental to reptile and amphibian populations in and around the Green River SFWA. Restrictions on the use of these roads by wind-farm vehicles will aid in holding these losses to existing levels.

Recommendation #4: The County should consider a minimum one-half mile buffer from the boundary of each area designated in the Inventory within GRSFWA to reduce the adverse effects of visibility, shadow-flicker, noise, vibration, and illumination from nearby wind turbines.

Recommendation #5: The County should require flicker modeling for all wind turbines within one mile of GRSFWA to identify and control or eliminate flicker impacts within GRSFWA.

If a flicker model study indicates flicker impacts to the GRSFWA, the County should consider a requirement to inactivate and lock the responsible turbines for those periods where flicker would occur within the GRSFWA.

Recommendation #6: If currently-proposed locations for the wind turbines are approved, the County should consider a requirement to measure sound impacts to the GRSFWA using methods which identify A-weighted, B-weighted, and C-weighted decibel levels and the octaves in which the strongest frequencies occur. Such data can then be related to wildlife auditory capabilities and sensitivities.

Recommendation #7: The County should consider a prohibition on all wind-farm-related traffic on the segment of Pump Factory Road which passes through the GRSFWA, and suitable restrictions on wind farm traffic on the roads which bound the GRSFWA. The Department recognizes that some wind farm traffic on Maytown Road may be unavoidable.

Recommendation #8: The County should consider a requirement to deploy an FAA-approved Audio-Visual Warning System to minimize intermittent illumination of the Green River State Fish & Wildlife Area.

Sand Prairie Habitat Area INAI Site. Some 260 acres of the 316-acre Sand Prairie State Habitat Area, occupying the South Half of Section 18 in Hamilton Township, are designated as an Illinois Natural Areas Inventory Site. The Site provides essential habitat for at least six State-listed endangered or threatened species: two birds, two turtles, a snake, and a fish. It is likely a third State-listed turtle and a butterfly are also present. The Sand Prairie SHA lies within Lee County, but the County Line forms its western boundary. No part of the Sand Prairie State Habitat Area is currently dedicated as a Nature Preserve or registered as a Land & Water Reserve pursuant to the *Illinois Natural Areas Preservation Act*.

It is the Department's opinion the proposed action is likely to adversely modify the Sand Prairie Habitat Area INAI Site.

Within Lee County, GRWF proposes nine wind turbines within one mile of the Sand Prairie SHA;⁵ four of these would be within one-half mile of the INAI Site boundary within the SHA.⁶ It is the

⁵ T28, T31, T34, T36, T37, T38, T40, 41.

⁶ T31, T33, T34, T37. T31 and T33 are also within one mile of Foley Nature Preserve.

Department's opinion turbines within one mile will register impacts within the Sand Prairie Habitat Area INAI Site related to visibility, flicker, noise, vibration and intermittent illumination.

Of greatest concern is a turbine proposed for the NE Quarter of Section 18, about 1,000 feet north of the SHA boundary. Essential habitat for State-listed species extends through this area, connecting habitats within Sand Prairie SHA to habitats within Foley Sand Prairie Nature Preserve. A turbine in this location has the maximum potential to adversely modify essential habitat within both State properties, diminishing their conservation value, and may further fragment the existing block of essential habitat, part of which lies between the two State-owned properties.

In the past, a number of endangered turtles have been killed while crossing Tampico Road (County Highway 12), which forms the south boundary of the Sand Prairie State Habitat Area. Evidently much of the upland essential habitat for that species is located south of Tampico Road. Wind farm construction activities create significant traffic on local roads. It would benefit this species a great deal to restrict or prohibit construction-related traffic on Tampico Road in the vicinity of Sand Prairie State Habitat Area.

Recommendation #9: The County should consider a minimum one-half mile buffer from the boundary of the INAI Site within Sand Prairie SHA, in which wind turbines may not be located, to reduce the adverse effects of visibility, shadow-flicker, noise, vibration, and illumination from nearby wind turbines.

Recommendation #10: The County should require flicker modeling for all wind turbines within one mile of Sand Prairie SHA to identify and control or eliminate flicker impacts within Sand Prairie SHA. If a flicker study indicates flicker impacts to the SHA, the County should consider a requirement to inactivate and lock the responsible turbines for those periods where flicker would occur within the SHA.

Recommendation #11: If currently-proposed locations for the wind turbines are approved, the County should consider a requirement to measure sound impacts to the SHA using methods which identify A-weighted, B-weighted, and C-weighted decibel levels and the octaves in which the strongest frequencies occur. Such data can then be related to wildlife auditory capabilities and sensitivities.

Recommendation #12: The County should consider restricting or prohibiting wind farm construction traffic on Tampico Road for at least one mile east of the County Line.

Recommendation #13: The County should consider a requirement to deploy an FAA-approved Audio-Visual Warning System to minimize intermittent illumination of Sand Prairie State Habitat Area.

Dickenson INAI Site. The privately-owned Dickenson INAI Site in Section 15 provides essential habitat for two State-listed turtles. Only one turbine is proposed in its vicinity, at just under one mile's distance. The turbine's location lies on a bearing which makes it unlikely to cast flicker on the INAI Site itself, but it is possible that nesting and hibernation areas for these species extend beyond the INAI Site boundaries into areas which are subject to flicker and other turbine impacts.

It is the Department's opinion the proposed action is unlikely to adversely modify the Dickenson INAI Site. Potential adverse effects to essential habitat outside the INAI, but associated with it, are addressed in the species discussions below.

East Grove INAI Site. The privately-owned East Grove INAI Site is located in Section 34 of East Grove Township; it provides essential habitat for a State-listed endangered plant. The nearest wind turbine proposed by GRWF is located in the NE Quarter of Section 33, more than one-half-mile from the INAI Site boundary. Because the INAI Site is wooded and lies in a ravine, it will be shielded from any possible shadow-flicker related to the GRWF turbine. (The Department notes the INAI Site is bracketed by two turbines of the Big Sky Wind Farm which are closer, with the nearer one being only four hundred feet from the INAI boundary. Consequently, any impacts extending from the GRWF turbine array, such as noise or vibration, will be inconsequential by comparison.)

It is the Department's opinion the proposed action is unlikely to adversely modify the East Grove INAI Site.

Ryan Wetlands & Sand Prairie INAI Site and Land & Water Reserve. The western portion of this large INAI Site is owned by the Lee County Soil & Water Conservation District and has been registered with the Illinois Nature Preserves Commission as a Land & Water Reserve; the remainder is in private ownership. The site provides essential habitat for two State-listed turtles and a State-listed butterfly.

The two closest turbines proposed by GRWF will be located nearly four miles to the west; due to topography and intervening vegetation, they may not be visible from within the Site boundaries and will lie beyond the range where other impacts will be discernable to humans without scientific instruments.

This INAI Site is surrounded by turbines of the Big Sky Wind Farm, five of which lie within one-half mile but none closer than a quarter-mile. The Site was registered as a Land & Water Reserve *after* permits for Big Sky turbines were issued. At the time, a quarter-mile setback was believed to be adequate to protect turtles which might nest beyond Site boundaries and to reduce the potential for collisions with butterflies; but the effects of noise and shadow-flicker on the Site were not considered during consultation.

Ryan Wetlands & Sand Prairie is significantly affected by both turbine noise and shadow-flicker at levels easily discerned by humans. Funds and other resources have not been available to scientifically study the effects of these impacts on the State-listed species and other wildlife within the INAI Site, but reports from knowledgeable observers suggest these impacts have been detrimental.

This Site provides a compelling example of adverse modification of the environment within an INAI Site due to the lack of an adequate buffer from utility-scale wind turbines. The Department notes that wind turbines vary significantly in their operating characteristics from one model to another, so that the range and intensity of potential adverse effects will also vary. Such variance can be given reasonable consideration in siting decisions, but the Department urges a conservative approach when deriving buffers for sensitive natural resources.

Due to distance and the nearer presence of existing wind turbines, it is the Department's opinion the proposed turbines associated with the GRWF project are unlikely to adversely modify the Ryan Wetlands & Sand Prairie INAI Site and Land & Water Reserve.

Ornate Box Turtle, *Terrapene ornata ornata*. The Ornate Box Turtle was listed by Illinois as threatened in October 2009. Many populations have been adversely affected by habitat conversion for agriculture and over-collection for the pet trade. Because of their commercial value, poaching may be a serious problem in some areas.

This species has been reported within the last decade from sites within the evaluated footprint in Lee County, including west and north of Ryan Wetlands, within and east of Green River SFWA, and west of Sand Prairie SHA in adjacent Whiteside County. Being a small (<six inches) terrestrial turtle which spends significant time underground, this animal can easily escape notice.

Recent experiments with radio-tagged Ornate Box Turtles in Illinois⁷ have shown that, even where the species is abundant and active on the surface, the probability of human searchers finding even one specimen during a survey is less than 3%; numerous unsuccessful surveys would be needed to confidently and reliably conclude suitable habitat is unoccupied by this species. (Using specially-trained “turtle dogs” increases detection success by more than 300% but many turtles still goes undetected.)

Significant acreages of suitable soils and fragmented habitat exist within and adjacent to the Lee County footprint of this project. Although GRWF has carefully analyzed the locations of available primary habitat, no on-the-ground surveys for this species were attempted.

A number of life history characteristics increase the vulnerability of this species to disturbances during both construction and operation of a wind farm.

From late September through mid-April, the Ornate Box Turtle hibernates (more properly, as a reptile, it brumates) in burrows as deep as three feet underground. Such burrows are far from obvious to humans, so that for more than six months of the year this species is not subject to observation. Construction activities in occupied habitat during this period run the risk of killing or injuring turtles during excavation of power line routes and turbine foundations, or of sealing such burrows when constructing access roads. The only practical means of avoiding such outcomes is to perform such tasks during the Turtle’s active periods.

However, when “active,” this species continues to spend significant portions of each day underground, either in burrows or shallow excavations near the surface called “forms.” (During their first two or three years, hatchlings spend virtually all of their time underground.) Thus, even during the “active” portion of the Turtle’s annual cycle, excavation activities in occupied habitat run a high risk of injuring or killing unobserved animals.

Moreover, this species demonstrates extremely high fidelity to brumation sites, often returning to within a meter of where it spent the winter the prior year. If a brumation site is located where a turbine foundation or access road is installed, it is unclear how a turtle will respond. There is always the chance that an alternate brumation site will not assure survival through the winter.

Some suggest Turtles can simply be moved out of the way. In the first place, such handling constitutes a “take” which requires a permit from the Department. But two other factors work against such a method.

⁷ Refsnider and Mitchell, et al.; A Generalized Method to Determine the Detectability of Rare and Cryptic Species Using the Ornate Box Turtle as a Model; Wildlife Society Bulletin 35(2):93-100, 2011.

(1) Home ranges for this species are very small, consisting of only a few acres, though home ranges often overlap, and (2) this species is highly philopatric, meaning it has an extremely strong attachment to its home range, and will return to it if removed, or die trying. Thus, moving a Turtle “out of harm’s way” may result in removing the animal from its home range, exposing it to various threats during its efforts to return. If its return is successful, it will be in harm’s way again, perhaps repeatedly.

Because this species finds movement through dense vegetation difficult, it prefers areas where vegetation is sparse or absent. Roads satisfy this desire for easy movement (as do tilled fields), and also provide basking areas where temperatures may rise more quickly in the morning or during cooler weather. Most of the Department’s observation records for this species are adjacent to roads or are recorded as road-kills. Further, a study of nesting radio-tagged females on an Illinois federal wildlife refuge⁸ found that 50% of selected nest sites were directly adjacent to the single road which crossed the study area; this is clearly not a random result. Therefore, increased levels of traffic associated with construction and the construction of thousands of feet of new roads pose a significant threat of disruption and loss to any existing population.

The operation of wind turbines near occupied habitat may constitute an on-going “take” of this species in terms of harassment or interference with normal activities.

Shadow-flicker may pose a serious long-term threat. Theoretically, at dawn or sunset over flat ground, shadows may be cast more than a mile. After accounting for diffusion and diffraction through the atmosphere under varying conditions, meaningful shadows may extend over half a mile, but the intensity of shadow needed to produce an effect on wildlife is unknown. Nevertheless, it can be understood that shadows will impact a very large portion of the ground in the vicinity of turbines for much of any given day. Shadows at the extremes may last for mere minutes, while other areas closer to the machines are affected for hours at a time. If turbines are spaced together closely enough along roughly the same latitude, the same ground may be affected in both the morning and the evening by shadows cast by different turbines. (At this latitude, the area affected by shadows at some time of the year is shaped something like a bow-tie; there is never a shadow on a significant area centered due-south of a turbine.)

The Ornate Box Turtle’s daily pattern consists of an early morning emergence, followed by basking to raise its body temperature. When a body temperature suitable for activity is achieved, it forages across its range for several hours, feeding on worms, insects, and small mammals, until temperatures become too high, when it seeks shelter beneath vegetation, in a burrow, or in a “form.” It remains inactive until late afternoon or early evening, when temperatures allow a second foraging period. The Ornate Box Turtle retreats to a burrow before darkness falls, with the exception of females during nesting periods (late May and June), when eggs are laid at night.

Shadow flicker may seriously interfere with basking and foraging. Among this species’ predators are crows and hawks, and it has been established this species is sensitive to movement within its range of vision, which causes it to “freeze” and adopt a surveillance posture called “standing rest.”⁹ Shadow flicker may mimic the movement of both aerial and terrestrial predators which stimulate the “standing rest” response, though this has not been investigated with respect to wind turbines. If this does occur, it

⁸ Ibid.

⁹ Plummer, Michael V.; Activity and Thermal Ecology of the Box Turtle, *Terrapene ornata*, at its Southwestern Range Limit in Arizona; Chelonian Conservation and Biology; 4(3):569-577; 2003.

would constitute a prohibited taking (harassment) within the meaning of the law. Coupled with the fact that entire home ranges, being small, may be subject to shadow flicker, Turtles may be stressed and underfed, leading to breeding failures and decreased survival. Most of the turbines proposed for Lee County will cast shadows on known or suitable Ornate Box Turtle habitat.

Turbine-generated noise is usually considered in the context of human impacts, but it does have the potential to interfere with animal communication and survival. Sound wave intensity decreases according to an inverse square law, so that at twice the distance it has one-fourth the intensity. Going the other way, at half the distance it is four times louder. A common benchmark for wind turbines is a sound level equivalent to normal conversation at 1,000 feet.

As an example, a circle with a 1,000-foot radius encompasses about 72 acres, throughout which turbine noise is likely to equal or exceed normal conversation (but sounds less intense than this may be audible to turtles). The overlapping home ranges of dozens of Ornate Box Turtles could be contained within an area of this size. The Ornate Box Turtle's mating ritual includes exchanges of sounds variously described as "vigorous aspirations" or "sibilant grunts" which may contain infra-sonic or ultra-sonic components not audible to humans. Turbine noise may be sufficient to mask these communications, whose importance to the mating ritual is not well-understood. Thus, turbine noise has the potential to decrease reproductive success. Virtually all the proposed turbine sites in Lee County may be within audible range of suitable Ornate Box Turtle habitat.

Turbine noise may also be sufficient to mask the approach of predators, though the range of such an effect is unknown, and may vary among turbine models. Predators include coyotes, badgers, skunks, raccoons, opossums, and other mammals (as well as the also-state-listed Plains Hognose Snake, an egg-predator). The Ornate Box Turtle is most vulnerable when younger—it cannot close its shell completely until about four years old, and the shell does not completely harden until about ten years of age. Losses to predation decrease greatly with advancing age and experience. Turbine noise may render predator detection and evasion more difficult, decreasing survival.

Turbine vibrations may pose another risk factor. Many reptiles are very sensitive to vibrations transmitted through the ground, as are earthworms and other soil organisms on which Turtles feed. Vibrations may affect the supply of prey and impose additional stress, but if animals become habituated to them, they may remain oblivious to threats they would otherwise detect through this means. It might be possible that vibrations (produced by the wind even when turbines are not operating) might interfere with their winter brumation, which could increase the main cause of natural mortality for this species.

Underground collection power lines may affect Ornate Box Turtles through thermal radiation. All electrical conductors provide resistance to current, which in turn produces heat. In the air, heat is easily dissipated but, underground, heat can only be transferred to surrounding soils, which will increase the temperature of those soils above normal, though the number of degrees and the distance from the conductor these effects may extend will vary with soil characteristics.

The gender of Ornate Box Turtles is determined by the temperature of the egg in the nest. While the exact temperature of sexual differentiation in this species has not been determined, it is known that eggs incubated at 84°F will produce 100% females. Nests are typically placed at depths no greater than 10-14 inches, but the Department has no data on the degree of heating produced in underground collection

cables, which are normally placed at depths of about four feet, and so is unable to fully evaluate potential impacts to populations from this cause.

Underground power lines may affect this species during brumation. Turtles must lower their metabolism to levels which will allow them to survive the winter based on their reserves of fat, and their metabolic rate is determined by body temperature. As noted, Turtles return to nearly the exact location used the prior year for brumation. Power lines through or beneath such locations could prevent Turtles from achieving the low body temperature needed for survival.

The potential adverse effects of shadow-flicker, noise, vibration, and thermal radiation on the Ornate Box Turtle have not been reported at this point in time, but the Department is unaware of any effort by biologists or others to investigate the significance of such factors for this species. Such effects are plausible and should be considered by developers and government officials.

GRWF has suggested a 100-foot setback from suitable habitat on leased parcels for construction activities in order to protect Ornate Box Turtles which may be present. But the Department is unaware of any biological or ecological basis supporting a 100-foot setback for construction activities. There is no evidence suggesting the Ornate Box Turtle does not make forays extending beyond 100 feet from areas humans may perceive to be “suitable habitat,” and, as described above, important adverse effects from shadows, noise, and vibration may extend far beyond areas directly disturbed by construction.

Recommendation #14: The County should consider a requirement for the developer to obtain an Incidental Take Authorization from the Department for the Ornate Box Turtle.

The following recommendations will be most important if an Incidental Take Authorization is not obtained; any requirements imposed should allow pre-emption by an IDNR permit addressing the issue.

Recommendation #15: The County should consider a requirement that all contractors and employees working on the project should be trained to recognize the Ornate Box Turtle, to understand its significance to the project and the public, and be instructed how to respond to an observation or encounter with this species.

Recommendation #16: The County should consider a requirement for a pre-construction survey for the Ornate Box Turtle in suitable habitat within 0.6 miles of proposed turbine locations, performed using suitably-trained dogs, during months when this species is active on the surface. No disturbance related to the project should be allowed in any habitat demonstrated to be occupied by the Ornate Box Turtle unless an Incidental Take Authorization has been obtained from the IDNR.

Recommendation #17: The County should consider a requirement, if Ornate Box Turtles are found within the project footprint, for the developer to conduct radio-telemetry studies (after securing the required permits from IDNR) of their movements and responses to turbines, collection power lines, and access roads with the goal of determining and reporting the degree of any adverse effects plausibly caused by construction and operation of the wind farm.

Recommendation #18: Where the Ornate Box Turtle is determined to be present, the County should consider a requirement for the developer to establish and fund a predator control program to reduce

predation of nests and Turtles, a similar program to combat poaching of the Ornate Box Turtle, and an incentives program for private land owners to promote conservation of this species.

Recommendation #19: If the Ornate Box Turtle is determined to be present, the County should consider posting signs along public roads within the project footprint alerting motorists to the risk of killing or injuring this species. If and when this species is documented crossing a public road, a “Turtle Crossing” sign should be considered 200 hundred feet on either side of the crossing point.

Recommendation #20: The County should consider a requirement for a periodic assessment of Ornate Box Turtle populations, at least once per decade, with a report to County officials and the IDNR of apparent population trends and possible explanations for the results.

Plains Hognose Snake, *Heterodon nasicus nasicus*. Formerly known as the Western Hognose Snake, this stout-bellied reptile is also an inhabitant of sand prairies and similar ecosystems, and is often found in the same areas as the Ornate Box Turtle, of which it is a natural enemy (as a predator of turtle eggs), although its primary prey consists of toads, lizards, ground-nesting birds, other snakes, and small mammals.

It can be easily confused with its close relative, the **Eastern Hognose Snake, *Heterodon platirhinos***, and the ranges of the two species often overlap, though the Eastern Hognose is more often found in wooded areas than the Plains Hognose which, as its name implies, prefers more open habitats. Both species can be found in and near the project footprint (both are present at GRSFWA). They are most reliably distinguished by the coloration of the underside of the tail: that of the Eastern Hognose is always much lighter than the rest of the belly, while that of the Plains Hognose is the same dark shade as the rest of the belly.

The name “Hognose” is descriptive of the upturned scales on the snake’s snout. Unlike many snakes these species can burrow in loose soils due to these specialized scales. Though they can actively hunt, they often bury themselves with only their eyes exposed and lie in wait to ambush prey. Like the Ornate Box Turtle, this species spends much of its time underground for purposes of thermo-regulation and is therefore difficult to observe. Many Department records are road-kills.

The Hognose snakes are also famous for their defensive behavior. A threatened snake will flatten its body, hiss, feign strikes, and defecate. If the aggressor is not deterred, the snake will roll onto its back and pretend to be dead; if placed back on its belly, it will roll over again and repeat the display.

Because of its docile nature, this non-venomous snake is popular in the pet trade, and many populations have suffered from over-collecting. Poaching and persecution continue to be serious problems. These are aggravated by losses of habitat to tilled agriculture.

The Hognose has many natural enemies: other snakes, hawks and owls, and mammals such as coyotes, foxes, raccoons, skunks, and opossums. An egg-layer, its shallow nests are vulnerable to predation; neonates are about six inches long, but adults seldom reach 30 inches. Females cannot reproduce until their second year. Home ranges tend to be small, consisting of just a few acres, but individual territories are not exclusive and a few acres may hold a number of snakes.

The Plains Hognose Snake may be vulnerable to many of the same characteristics of wind farms as the Ornate Box Turtle. Unfortunately, where both wind turbines and Hognose Snakes are common, as in Texas, it appears nobody has investigated interactions between this technology and this animal.

Obviously, construction can destroy and fragment habitat, and risks killing the snake by crushing it with vehicles or through active persecution or collection by construction workers.

Shadow-flicker, as discussed previously, may interfere with basking and feeding through stimulating predator-evasion responses. While prey-detection may be primarily by sight or scent, ground vibrations from turbines might interfere with successful detection and feeding. Thermal radiation effects from underground collection power lines may interfere with brumation, but are less likely to affect reproduction, since the nests of the Hognose are much closer to the surface than those of the Ornate Box Turtle.

The Plains Hognose Snake is as cryptic and as difficult to detect as the Ornate Box Turtle, so that “visual encounter surveys” are an unreliable technique for assessing the presence or absence of this species, or the size of a population. Nor is the occasional road-kill a good barometer of numbers. As with the Ornate Box Turtle, trained dogs are likely to have a higher detection success rate.

The Plains Hognose Snake has been reported from the Sand Prairie State Habitat Area, from several sites within and east of the Green River SFWA and populations are known to exist within and near the project footprint in Whiteside County. In the Department’s opinion, it is likely this species is also present at Foley Sand Prairie Nature Preserve and in remaining fragmented habitats in southwestern Lee County.

Recommendation #21: The County should consider a requirement for the developer to obtain an Incidental Take Authorization from the Department for the Plains Hognose Snake.

The following recommendations will be most important if an Incidental Take Authorization is not obtained; any requirements imposed should allow pre-emption by an IDNR permit addressing the issue.

Recommendation #22: The County should consider a requirement that all contractors and employees working on the project should be trained to recognize the Plains Hognose Snake, to understand its significance to the project and the public, and be instructed how to respond to an observation or encounter with this species.

Recommendation #23: The County should consider a requirement for a pre-construction survey for the Plains Hognose Snake in suitable habitat within 0.6 miles of proposed turbine locations, performed using suitably-trained dogs, during summer months. No disturbance related to the project should be allowed in any habitat demonstrated to be occupied by the Plains Hognose Snake unless an Incidental Take Authorization has been obtained from the IDNR.

Recommendation #24: The County should consider a requirement, if Plains Hognose Snakes are found within the project footprint, for the developer to conduct radio-telemetry studies (after securing the required permits from IDNR) of their movements and responses to turbines, collection power lines, and access roads with the goal of determining and reporting the degree of any adverse effects plausibly caused by construction and operation of the wind farm.

Recommendation #25: Where the Plains Hognose Snake is determined to be present, the County should consider a requirement for the developer to establish and fund a predator control program to reduce predation of nests and snakes, a similar program to combat poaching of the Plains Hognose Snake, and an incentives program for private land owners to promote conservation of this species.

Recommendation #26: If the Plains Hognose Snake is determined to be present, the County should consider posting signs along public roads within the project footprint alerting motorists to the risk of killing or injuring this species. If and when this species is documented crossing a public road, a “Snake Crossing” sign should be considered 200 hundred feet on either side of the crossing point.

Recommendation #27: The County should consider a requirement for a periodic assessment of Plains Hognose Snake populations, at least once per decade, with a report to County officials and the IDNR of apparent population trends and possible explanations for the results.

Blanding’s Turtle, *Emydoidea blandingii*. The Blanding’s Turtle was well-adapted to the pre-settlement landscape of Lee County with its many prairies and wetlands. However, the loss of most wetlands and prairies to tilled agriculture has severely diminished and fragmented its essential habitat, which tends to isolate small groups of turtles, which can then suffer the genetic effects of in-breeding and are more vulnerable to poaching, predation, and disease. Small groups are particularly vulnerable to the loss of sexually-mature females. Illegal collecting for the pet trade and road-kill mortality can doom a small group to eventual extirpation.

Among Midwestern aquatic and semi-aquatic turtles, the Blanding’s Turtle is notable for the extended distance from the water at which it nests, farther than any other aquatic turtle. It is not unusual for this species to nest a quarter-mile, half-mile, or up to a mile away from wetlands and streams. The Blanding’s Turtle is also noted for its strong fidelity to nesting sites, with females returning year after year to the same area. However, if they cannot return to a proven site, they will eventually lay their eggs—a new nesting site may be established if the hatchlings survive.

Blanding’s Turtles can live to a great age, more than fifty years. This means that, under natural conditions, only one percent of hatchlings need to survive to maturity to maintain a population. However, females do not become sexually-active until age 16-20, and may reproduce only in alternate years. Moreover, clutch sizes rarely include more than a dozen eggs, and hatchlings must travel significant distances to reach water and safety, a journey many do not survive, even if they hatch. In many parts of Illinois, 100% of nests are predated by mammals within 24 hours of egg deposition. Females move to and select nesting sites at night. Nests are often chosen in tilled agricultural fields in late May through June, and eggs hatch in roughly 60 days. In some years, conditions may force relatively late nesting; if eggs hatch in late October, hatchlings may successfully overwinter in the nest. Like the Ornate Box Turtle, hatchling gender is determined by incubation temperature, with less than two degrees making the difference.

The Blanding’s Turtle spends most of its time in the water, preferring ponds less than nine feet deep, but also using wetlands such as marshes and sedge meadows. They brumate from as early as late October through March in burrows excavated below water level in streams and ponds, emerging in late March and early April, when males may travel significant overland distances in search of mates, though such

movements may also occur periodically in the summer and fall. Spring basking by females after mating is crucial to ripen eggs prior to nesting. The Blanding's Turtle is a notoriously skittish sun-bather. It is very difficult to approach a basking Blanding's Turtle close enough to make a positive identification (the solid yellow throat is the best marker); they enter the water at the least disturbance. Most human interactions with this species occur on dry land.

In addition to the potential for direct taking through excavation and vehicle mortality, the operation of wind turbines near occupied habitat may constitute an on-going "take" of this species in terms of harassment or interference with normal activities.

As with the Ornate Box Turtle, shadow-flicker may pose a serious long-term threat, mainly through delaying nesting through interference with basking if flicker extends to ponds and marshes. Delayed nesting decreases the chance hatchlings will be able to reach aquatic habitat and establish themselves before winter. However, flicker may also complicate overland journeys, by day or night, if these shadows stimulate a response to danger.

The main threat posed by turbine-generated noise may be its ability to mask the approach of predators. This will be most important where turtles have the ability to evade capture, in and near water.

Turbine vibrations may pose a risk factor if this species cannot tolerate them in their aquatic environments.

While roads and underground collection power lines are unlikely to be constructed through wetlands, construction of these facilities elsewhere may destroy or disrupt established nesting grounds (and nests that may exist there), or—in the case of roads--create barriers to movement by adults and hatchlings, or introduce the potential for road-kill where none existed before. Construction activities threaten this species with road-kill and the entrapment of turtles in open excavations. The species is noted for taking the shortest route to its destination; when encountering an obstacle, a turtle will move to the end of the barrier then resume its line of advance. Adults of this species cannot scale an obstacle more than six inches high.

The potential adverse effects of shadow-flicker, noise, vibration, and thermal radiation on the Blanding's Turtle have not been reported at this point in time, but the Department is unaware of any effort by biologists or others to investigate the significance of such factors for this species. Such effects are plausible and should be considered by developers and government officials.

A setback from suitable wetlands is insufficient to prevent adverse impacts to the Blanding's Turtle due to its extensive terrestrial movements. Other precautions are usually taken to screen turtles out of dangerous areas, but these cannot address the possibility of affecting undetected nests. A large proportion of the proposed project area lies within reach of known Blanding's Turtle locations.

In 2000, a population of this species with healthy sex ratios (two female for each male) and a good age distribution was present in ponds of the Sand Prairie State Habitat Area east of County Line Road. The species is also present at Green River State Fish & Wildlife Area and on a number of privately-held sites east of the SFWA, including Ryan Wetlands and Sand Prairie INAI Site.

Recommendation #28: The County should consider a requirement for the developer to obtain an Incidental Take Authorization from the Department for the Blanding's Turtle.

The following recommendations will be most important if an Incidental Take Authorization is not obtained; any requirements imposed should allow pre-emption by an IDNR permit addressing the issue.

Recommendation #29: The County should consider a requirement that all contractors and employees working on the project should be trained to recognize the Blanding's Turtle, to understand its significance to the project and the public, and be instructed how to respond to an observation or encounter with this species.

Recommendation #30: The County should consider a requirement for a pre-construction trapping survey for the Blanding's Turtle in ponds within 0.6 miles of proposed turbine locations. Surveys are normally conducted in May and June, though efforts during the entire active period can be helpful. The Department does not endorse the use of "windshield" surveys along roadsides for this species.

Recommendation #31: The County should consider a requirement, if Blanding's Turtles are found within the project footprint, for the developer to conduct radio-telemetry studies (after securing the required permits from IDNR) of their movements and relationships to turbines, collection power lines, and access roads with the goal of determining and reporting the degree of any adverse effects plausibly caused by construction and operation of the wind farm.

Recommendation #32: The County should consider a requirement for a shadow-flicker modeling exercise for any turbine in proximity to suitable Blanding's Turtle habitat to determine the dates and times when flicker may affect Turtle behavior during key periods of its life cycle.

Recommendation #33: Construction sites within 0.6 miles of suitable aquatic habitat for the Blanding's Turtle should be screened with silt fence to exclude wandering turtles from entering hazardous areas. These perimeter fences should be inspected each morning, along both the interior and exterior, to detect turtles attempting to enter the site or which have been prevented from leaving. Any such observations should be promptly reported to the IDNR.

Recommendation #34: Where the Blanding's Turtle is determined to be present, the County should consider a requirement for the developer to establish and fund a predator control program to reduce predation of nests and turtles, a similar program to combat poaching of the Blanding's Turtle, and an incentives program for private land owners to promote conservation of this species.

Recommendation #35: If the Blanding's Turtle is determined to be present, the County should consider posting signs along public roads within the project footprint alerting motorists to the risk of killing or injuring this species. If and when this species is documented crossing a public road, a "Turtle Crossing" sign should be considered 200 hundred feet on either side of the crossing point.

Recommendation #36: The County should consider a requirement for a periodic assessment of Blanding's Turtle populations, at least once per decade, with a report to County officials and the IDNR of apparent population trends and possible explanations for the results.

Yellow Mud Turtle, *Kinosternon flavescens*. Until recently, this animal was called the Illinois Mud Turtle and was thought to be a distinct subspecies (*Kinosternon f. spooneri*). However, genetic studies have demonstrated the Illinois turtles are genetically identical to *Kinosternon flavescens*. Hence, the name was changed and these animals in Illinois are now considered the same species.

Portions of Lee County along the Green River represent the extreme northern and eastern extension of the range of the Yellow Mud Turtle in North America. Populations in Illinois, Iowa and Missouri are separated from the rest of this species by hundreds of miles. Groups tend to be small and isolated, and many known populations have been extirpated within the last twenty years. However, biologists have tended to underestimate total numbers. For example, in the late 1980's, the entire Illinois population was estimated to number less than 70 individuals, but a three-year trapping and radio-telemetry study of a single population node in Mason County in 2007-2009 identified 50 individual adults, suggesting this turtle is more numerous than previously supposed. There is no question, though, the species remains in danger of extirpation in Illinois.

This species requires deep sand soils beneath prairie vegetation for hibernation, which are located near shallow ephemeral or permanent ponds, where most feeding activities occur. Burrowing occurs at least 100 meters from the water's edge, with distances on the order of 400-500 meters (roughly a quarter-mile) being most common, but distances of over 2000 meters (1.2 miles) have been documented. These turtles will cross bare earth, agricultural fields, and roads, but will not burrow in sand blows or forested areas. They demonstrate an extremely high degree of fidelity to their burrow sites; groups of Turtles may share the same pond, but retreat to widely-separated sandy areas for hibernation.

The Yellow Mud Turtle hibernates for longer periods than any other North American turtle. (In Illinois, this species may be active for as few as 100 days a year.) Turtles emerge from hibernation in the third or fourth week of April, often in the afternoon following a heavy rainfall, and move directly to water. Mating is the first order of business, usually in the first weeks of May, and occurs prior to heavy feeding. They are sluggish until water temperatures are consistently above 65°. These Turtles prefer ephemeral or shallow ponds, and feed heavily on snails, leeches, worms, tadpoles, and beetles, as well as some vegetation.

In mid-to-late June, females begin nesting. This is the only North American Turtle which will lay its eggs directly on the ground surface, although just as often eggs are laid in a burrow or aestivation site, at depths between three and six inches. (This species is very vulnerable to the use of farm equipment, off-road vehicles, and ATV's due to this characteristic.)

This is the only turtle which exhibits parental care; females will remain with or near their eggs for extended periods, up to forty days, perhaps to defend them from predators. But they do not remain with the eggs until they hatch, which occurs between 60 and 90 days (August-September). Mammalian meso-predators, particularly raccoons, and hognose snakes are the main egg predators. (An Iowa study found that removal of raccoons virtually eliminated nest predation.) Like the Ornate Box Turtle and the Blanding's Turtle, hatchling gender is determined by nest temperature: 86° produces all females, while temperatures below 81° produce mainly males. Eggs incubated below 76° do not hatch.

The Yellow Mud Turtle seeks shelter when temperatures are above 90° by burrowing into the mud or sand and aestivating. Consequently, crucial feeding may be interrupted by extended high temperatures.

By late July most adults have left or are leaving the water for the year. Adults enter hibernation in late August or early September, although short bursts of activity may follow rain events.

Hatchlings remain in the nest until the following spring, but they must burrow deeply enough to escape freezing during the winter. In the spring they must make the long trek to water. Mortality among hatchlings is high, estimated to run about 80% during their first year, mainly due to predation, but survival improves rapidly thereafter. The typical life-span in the wild is about 15 years, but females do not sexually mature for 6-7 years, and may not produce a clutch every year.

Studies of this species typically are resource-intensive in terms of both man-hours and technology. Drift fences and baited traps are the usual methods employed to initially capture turtles, with radio-telemetry used to follow movements, particularly to identify hibernation areas. However, catch-per-unit-effort ratios are very low.

The Yellow Mud Turtle has been recorded at Foley Sand Prairie, Sand Prairie Habitat Area INAI Site, and at the Dickenson INAI Site. However, none have been captured since 1989 (no efforts to locate them have been made since 2000). While this raises the possibility local populations may have been extirpated and no longer exist, past study efforts have not been intensive enough or of sufficient duration to support this conclusion.

Wind turbine and wind farm construction threaten this species in various ways. Adults and nests are vulnerable to being crushed by vehicles; aestivation, hibernation, and nesting sites may be destroyed or rendered inaccessible or less useful by the installation of turbine foundations, access roads, and power lines; the micro-site hydrology of ephemeral ponds may be altered by subtle changes in surface topography which, as a result of construction, divert drainage; and flicker, noise, and vibrations from operating turbines may interfere with mating, feeding, basking, and nesting.

Recommendation #37: The County should consider a requirement for the developer to obtain an Incidental Take Authorization from the Department for the Yellow Mud Turtle.

The following recommendations will be most important if an Incidental Take Authorization is not obtained; any requirements imposed should allow pre-emption by an IDNR permit addressing the issue.

Recommendation #38: The County should consider a requirement to trap water bodies with past records of this species (after securing land owner permission and the appropriate permits from IDNR) in an effort to determine whether the Yellow Mud Turtle is present in these ponds in May/June.

Recommendation #39: The County should consider a requirement that all contractors and employees working on the project be trained to recognize the Yellow Mud Turtle, to understand its significance to the project and the public, and be instructed how to respond to an observation or encounter with this species.

Recommendation #40: Where the Yellow Mud Turtle is determined to be present, the County should consider a requirement for the developer to establish and fund a predator control program to reduce predation of nests and turtles, a similar program to combat poaching of the Blanding's Turtle, and an incentives program for private land owners to promote conservation of this species.

Recommendation #41: The County should consider a requirement, if any Yellow Mud Turtles are found, to use radio-telemetry in an effort to locate their home territories.

Recommendation #42: The County should consider a requirement that no turbines or other infrastructure supporting the wind energy project may be located in the home territories of this species, while facilities interposed between home territories and breeding ponds should pose no barriers to movement. Traffic in those areas should be restricted from May 1 until July 15.

Recommendation #43: If Yellow Mud Turtles are present, the County should consider a requirement to identify and avoid disturbance of the hydrology related to ephemeral ponds which may provide essential feeding habitat.

Recommendation #44: If Yellow Mud Turtles are present, the County should consider a requirement to establish a vibrational baseline in home territories and perform post-construction monitoring of vibration levels in the home territories to determine any potential response by the Turtles.

Recommendation #45: If Yellow Mud Turtle are present, the County should consider posting signs along public roads within the project footprint alerting motorists to the risk of killing or injuring this species. If and when this species is documented crossing a public road, a "Turtle Crossing" sign should be considered 200 hundred feet on either side of the crossing point.

Recommendation #46: The County should consider a requirement for a periodic assessment of Yellow Mud Turtle populations, at least once per decade, with a report to County officials and the IDNR of apparent population trends and possible explanations for the results.

Regal Fritillary Butterfly, *Speyeria idalia*. This grassland butterfly has an unusual life cycle and specific relationships with particular plants. Recent records have been established in several locations in Whiteside County (at Wahl/Garman Prairie in Section 24, and also in Section 26), in Lee County (at Foley Nature Preserve, Sand Prairie SHA, Green River SFWA, and Ryan Sand Prairie and Wetland Land & Water Reserve), and in Bureau County (McCune Sand Prairie).

People tend to think of butterflies in their adult life-stage, when they are most noticeable and recognizable but, where this species reproduces, it is present all year long. However, eggs and larvae (caterpillars) are considerably harder to spot. The literature on this species often mentions a specific host-relationship with the **Bird's-foot Violet**, *Viola pedata*, but the caterpillars have been documented feeding on at least eight species of Violets, so the presence or absence of Bird's-foot Violet is not a reliable indicator. Moreover, only violets growing in the context of prairie vegetation, even if they are a variety not preferred by the caterpillars, will support reproduction of this species.

Adult Regals are strong fliers and have been documented more than 20 miles from their reproductive sites. Females are prolific--but indiscriminate--egg-layers, producing up to 1,000 eggs each, one or a few at a time, but with no discrimination on which plants eggs are placed or in what ecological context those plants occur. Eggs hatch in the fall, and the new larvae fall to the ground, where they overwinter in vegetative litter. In the spring, the larvae must quickly find a suitable violet in order to feed, or perish.

The species is dimorphic, with the sexes being readily distinguishable by wing markings. Males emerge from metamorphosis first, in about mid-June, with females emerging about two weeks later. Only 10-15 days are available for mating, however, before the males die. Females must then survive until mid-September, when egg-laying begins. Adults survive on nectar and must have access to flowering plants to do so. Hence, prairie remnants depauperate in flowering forbs between June and October offer poor feeding habitat and can force adults to wander away from suitable reproductive locations.

Although this species has been observed at heights approaching 100 feet, it generally flies much lower, so that wind turbine collision is not a major threat. Fires (“controlled” or otherwise), predation, and vehicle collisions cause much mortality, as do “collectors” unaware of the status of this rare and beautiful insect. Eggs and larvae can also be devoured by mice and voles; they may be crushed by livestock, vehicle tires, and even foot-traffic; and, like any butterfly, they are vulnerable to vehicle collisions along roads, where many nectaring plants can still be found.

The Department is aware of no studies addressing the responses of insects like the Regal Fritillary to shadow-flicker, but this could be a factor with some effect. Insects are cold-blooded creatures and for some, such as the Hine’s Emerald Dragonfly, it has been demonstrated that stationary shadows are avoided, likely because the reduced solar radiation lowers body temperatures, which in turn reduces metabolism and agility. Flicker is of insufficient duration to cause such an effect, but its periodic motion might interrupt feeding or resting.

GRWF assessed potential habitat for this species in the project area and concluded the species is most likely to be encountered on state-owned properties which receive natural-area management. The Department does not disagree with this assessment, but it is always possible adults may be encountered far afield from their point of origin, and they are capable of establishing new reproductive sites in favorable habitat. Fairly extensive areas of suitable and potentially-suitable habitat are present in and adjacent to the project footprint in Lee County. Perhaps the greatest risk to this species will be posed by project-related traffic on Maytown Road adjacent to the Green River State Fish & Wildlife Area.

Recommendation #47: The County should consider a requirement for the developer to obtain an Incidental Take Authorization from the Department for the Regal Fritillary Butterfly.

The following recommendations will be most important if an Incidental Take Authorization is not obtained; any requirements imposed should allow pre-emption by an IDNR permit addressing the issue.

Recommendation #48: The County should consider a requirement that all contractors and employees working on the project be trained to recognize the Regal Fritillary Butterfly, both as a caterpillar and as an adult; to understand its significance to the project and the public; and be instructed how to respond to an observation or encounter with this species.

Recommendation #49: The County should consider a requirement that all sightings of possible or actual Regal Fritillaries be reported to the County and to IDNR.

Recommendation #50: Where the Regal Fritillary is present, during the construction phase project vehicles should reduce speed to minimize the risks of taking butterflies through collision, or find alternate routes posing less risk.

Recommendation #51: The County should consider a requirement to scientifically investigate whether the Regal Fritillary exhibits any response to flicker shadows.

Recommendation #52: The County should consider a requirement to mitigate for any reported losses of this animal or its documented habitat to the wind farm by contributing to the restoration and maintenance of suitable habitat nearby.

Loggerhead Shrike, *Lanius ludovicianus*, and Short-Eared Owl, *Asio flammeus*. Both of these listed species have been reported as breeding within the Sand Prairie State Habitat Area, and in the larger project area within the last decade. Suitable habitat is present in many areas within the Lee County portion of the project footprint. Neither species was observed during GRWF's breeding bird survey effort.

The Shrike nests in shrubs and small trees in open woodlots near open grasslands. It feeds primarily on large insects, like grass-hoppers and cicadas, and small rodents, such as mice and voles. Sometimes called the Butcher Bird, it often impales its prey on large thorns or twigs for several days, which aids in its dismemberment. Originally listed as "threatened," its continued decline resulted in a new status of "endangered" in 2009. Shifting agricultural practices which have eliminated many fencerows and windbreaks have been detrimental.

The Shrike is not known to be particularly vulnerable to turbine collisions, though some have been reported in western states. There is a greater potential for inadvertent nest destruction if trees are removed to improve transportation access or to reduce wind turbulence. Shadow-flicker could also be a factor of concern. If suitable habitat is present, there is always a chance a breeding pair will take up residence. Habitat need not be in a large block; railroads and roadsides sometimes are sufficient for breeding or wintering success, and nesting attempts at human homesteads have been reported.

The Short-Eared Owl is a prairie ground nester. Though primarily nocturnal, it often becomes active several hours before sunset. Small rodents are its primary prey, although snakes and other animals are sometimes taken. This species has nested successfully at Sand Prairie State Habitat Area. This species does migrate, but with an adequate prey base, can over-winter in the same habitat; owls observed in the winter are usually not the same owls as those present in the summer.

While it does have natural enemies, vehicle collision is a major source of mortality, since most flights are seldom higher than ten feet above ground and roadside habitats may provide the best local hunting areas.

The Short-Eared Owl hunts as much by sound as by sight, so that turbine noise may hamper feeding forays, while shadow-flicker may be stressful. These factors may also alter or affect prey abundance. A recent study from New Mexico found that mice were present in higher numbers in noisy areas, but avian predators were absent, apparently due to an inability to locate their prey due to anthropogenic noise.

The Department is not aware of any specific research investigating the response of the Short-Eared Owl to wind turbines.

Recommendation #53: The County should consider a requirement that all contractors and employees working on the project be trained to recognize the Loggerhead Shrike and Short-Eared Owl, to understand their significance to the project and the public, and be instructed how to respond to an observation or encounter with these species.

Recommendation #54: The County should consider a requirement that all sightings of Shrikes and Short-Eared Owls be reported to the County and to IDNR.

Northern Harrier, *Circus cyaneus*. The Northern Harrier (also called the Marsh Hawk) is a migratory grassland bird. Nearly all pre-construction bird surveys for Illinois wind farms have reported this species in spring and fall migrations but, to date, the Harrier is almost universally absent from post-construction surveys.

No nesting records have been documented in the vicinity, although suitable nesting habitat is available on private and state-owned lands in the area. Although not detected during GRWF surveys, observations of migrating Northern Harriers occurred in 2012 east of Deer Grove in Whiteside County.

Evidence continues to accrue that this species, more than others, actively avoids the vicinity of wind turbines. This not only renders otherwise suitable breeding and hunting habitat within a wind farm untenable; it may create a “barrier effect” when wind farms are spaced closely together, so that migratory patterns are disrupted.

In this case, the Green River Wind Farm will fall in the middle of a nearly-unbroken line of existing and proposed wind farms stretching more than 100 miles from DeKalb to Alexis in Mercer County. While the erection of such a barrier is not the sole responsibility of any single developer or county government, all should be aware of their contributions to a regional adverse impact to this endangered species.

Recommendation #55: The County should consider a requirement for post-construction migratory bird surveys, with a special emphasis on the presence or absence of the Northern Harrier.

Yellow-Headed Blackbird, *Xanthocephalus xanthocephalus*; Black-Crowned Night Heron, *Nycticorax nycticorax*; Least Bittern, *Ixobrychus exilis*. These three birds breed in and near wetlands. Each has been reported breeding in marshes within the western edges of the Green River State Fish & Wildlife Area, but none have been reported within the last ten years. The developer’s contractors did not observe any members of these species during avian surveys (but no survey locations were located within Green River State Fish & Wildlife Area, although three survey points were close by).

The Yellow-Headed Blackbird and Least Bittern are more particular when selecting breeding locations than the Black-Crowned Night Heron. These two species prefer a condition known as “hemi-marsh,” consisting of roughly equal parts of emergent vegetation and open water. Most of the wetlands at Green River SFWA currently do not satisfy this condition. The Yellow-Headed Blackbird, in particular, will not select a breeding site where the angle to the tops of surrounding trees is greater than 30 degrees. (Whether an angle greater than 30 degrees to the top of a wind turbine would preclude nesting is

unknown. However, no turbines are proposed in locations which would pose this question.) None of these three species is particularly sensitive to human activities, but no large wind turbines have been erected in Illinois in proximity to their essential habitats, so their likely response remains unknown.

Due to their prolonged absence from the GRSFWA and the proposed positions of project turbines in relation to habitat, *it is the biological opinion of the Department the proposed action is unlikely to adversely affect the essential habitats of the Yellow-Headed Blackbird, the Black-Crowned Night Heron, and the Least Bittern.*

Common Moorhen, *Gallinula chloropus*. The Common Moorhen (also called the Purple Gallinule) is another wetland waterfowl, which appears to be more tolerant of “closed” marsh conditions. Although the survey commissioned by Green River Wind complied with industry standards, all of its observation points were located on public roads, which limited its ability to detect all bird species using the vicinity of the project. It should be borne in mind that such surveys are sampling efforts which, by their very character, are far from exhaustive.

For the last two consecutive years, the Common Moorhen has successfully fledged young on Davin’s Pond, a water body lying mostly within the SW Quarter of the SE Quarter of Section 18, within the GRSFWA, lying between 400 and 1200 feet north of Maytown Road. Common Moorhens on Davin’s Pond would not be observed through sight or sound from Maytown Road. This species has not been observed on other water bodies at GRSFWA in recent years.

The nearest proposed turbines are located in Sections 24, 19, and 20, south of Maytown Road. The nearest turbines (T61, T65, and T71) will be about 0.7 miles from Davin’s Pond, at distances and bearings which may allow flicker on Davin’s Pond but only in winter months when the Common Moorhen will be absent. While noise and vibrations from these turbines may carry to Davin’s Pond, at distances of more than half a mile they will be slight, and this species has demonstrated a tolerance for anthropogenic noise.

It is the biological opinion of the Department the proposed action is unlikely to adversely affect the essential habitat of the Common Moorhen.

Starhead Topminnow, *Fundulus dispar*. These small fishes are located in ponds within the Sand Prairie State Habitat Area.

These ponds may experience vibration effects from proposed turbines T31, T34, and T36 and, near the equinoxes, there is some potential for flicker impacts to the ponds in the very early morning from T34. But, because these ponds have no external connection, there is no potential for these fish to leave the habitat in response to turbine effects. Moreover, at this distance the Department believes turbine vibrations are unlikely to be disruptive to feeding or reproductive activities, while flicker effects—and responses, if any—will be of slight duration on only a few days a year.

It is the biological opinion of the Department the proposed action is unlikely to adversely affect the essential habitat of the Starhead Topminnow.

Indiana Bat, *Myotis sodalis*, and other Bats. As demonstrated by fatalities of Indiana Bats at an Indiana wind farm in 2009 and 2010, and a Pennsylvania wind farm in 2011, this federally-listed species is vulnerable to collision with utility-scale wind turbines, especially during migration. It appears all species of bats occurring in Illinois are vulnerable to wind turbine collision.

The US Fish & Wildlife Service considers all of Illinois to lie within the historic range of the Indiana Bat. However, not all counties have records of Indiana Bats within the last thirty years. Until 2011, Bureau County had no records for this species. There are currently no records of the Indiana Bat in Whiteside or Lee Counties.

The Blackball Mine, near LaSalle-Peru, provides a winter hibernation site for the Indiana Bat, and it is the only “critical habitat” designated by the Fish & Wildlife Service for this species in Illinois. In April 2011, the Department conducted a telemetry study to follow the migratory flights of gravid female Indiana Bats as they emerged from hibernation in the Blackball Mine. The majority of bats entered the forests along the Illinois River and, after foraging for a few hours or days, moved downstream along the River in the direction of Peoria. A number of these bats selected maternity roost trees in Bureau County, in close association with the Illinois River and its tributary creeks, streams, and backwaters. However, none travelled up the Hennepin Canal and all remained in eastern Bureau County, approximately 20 miles southeast of the project area.

GRWF commissioned a thorough study of bats using the project area, employing both acoustic monitoring and mist-netting. No Indiana Bats were captured.

Consequently, it is the opinion of the Department the proposed project is unlikely to adversely affect the essential habitat of the Indiana Bat, and is unlikely to lie on a migration route for this species.

Acoustic monitoring and mist-netting are useful in identifying the entire local bat community which may be affected by a wind farm. Bats still considered common in Illinois have proven highly-susceptible to White-Nose Syndrome (WNS), a “new” disease first detected in New York in 2006 and currently devastating bat populations in more eastern states, and confirmed to have spread to Missouri and Iowa this spring. The disease was confirmed in Kentucky and Indiana in 2011. At this time, so far as is known, both Illinois and Wisconsin have not been infected by WNS, but it is merely a matter of time.

The Fish & Wildlife Service is now evaluating petitions to list the **Northern Long-eared Bat** (*Myotis septentrionalis*). The **Little Brown Bat** (*Myotis lucifugus*), **Big Brown Bat** (*Eptesicus fuscus*) and the **Tricolor Bat** (*Perimyotis subflavus*) are “common” species also susceptible to WNS. All four of these species are present within and adjacent to the project footprint in significant numbers. One or more of these bat species may become listed as endangered or threatened in Illinois during the useful life of the wind farm.

The average mortality of bats at Illinois wind turbines averages about four bats per turbine per year, but some facilities have reported much higher levels of 16 bats per turbine per year, and even 30 bats per turbine per year. Because of the uncertainties facing bat populations in Illinois, it would be prudent to conduct at least one year of post-construction monitoring of bat mortality in order to be better prepared to address future federal or state regulatory actions.

Recommendation #56: The County should consider a requirement the developer conduct at least one season of post-construction monitoring to assess or quantify the levels of bat mortality within the project area.

Bald Eagle, *Haliaeetus leucocephalus*, and Golden Eagle, *Aquila chrysaetos*. Eagles remain specifically protected by the federal *Bald and Golden Eagle Protection Act* though no longer listed as endangered or threatened under the federal *Endangered Species Act*.

Illinois has a strongly-resurgent Bald Eagle population. The nearest known nests are on the Hennepin Canal near Tiskilwa and along the Rock River. Proposed turbine locations are well-beyond the expected foraging ranges from those sites, although migrating Bald Eagles can be occasionally seen in the area. (Both a mature adult and an immature Bald Eagle were observed during the avian surveys.) But many new nests are established every year, some in unexpected areas. The Green River may offer habitat in some locations. The Bald Eagle is not particularly vulnerable to wind turbine collisions; these are extremely rare, even where Bald Eagles are numerous. However, if Bald Eagles are frequently observed in the vicinity, it would be prudent for the developer to consult the Fish & Wildlife Service.

The Golden Eagle, however, is more vulnerable to wind turbine collisions. While this species is not currently known to breed in Illinois, winter brings northern populations southward. It is not uncommon for this species to be observed along the Rock River, and a famous instance of an attempted predation of an adult white-tailed deer occurred at Nachusa Grassland in Lee County two years ago. This winter, Golden Eagles have been reported along the Mississippi River as far south as St. Louis. Golden Eagle populations are also expanding, which may lead to further enlargement of its winter range. Any observation of a Golden Eagle in the vicinity of the project should be cause for concern and a consultation with the Fish & Wildlife Service.

Migratory Birds. A mortality study at a Bureau County wind farm in 2007 averaged about two dead migratory birds per turbine per year. A similar study in McLean County found an average of six dead birds per turbine per year. Other mortality studies completed in Illinois produced results consistent with these numbers. Moreover, losses are spread across a large number of species, so that no one species suffers disproportionately. Waterfowl tend to be struck less often than other types of birds. A few species, such as the Northern Harrier and the American Golden Plover, have demonstrated an aversion to habitat occupied by wind turbines. Most stricken birds are night migrants flying during overcast conditions.

The use of aviation warning lights on tall structures has been long-recognized as a factor in the deaths of migratory birds. Both color and steadiness are factors; the research suggests that intermittent red lights produce the fewest bird deaths. This has been supported by recent events at wind farms in Appalachia: in once instance, technicians left on a white light inside the nacelle of a turbine, resulting in the mass collision deaths of more than 50 birds in a single night; in another case, outside lights were inadvertently left on at a wind farm substation, resulting in the mass death of several hundred migrants through collision with the power lines.

“No lights” is the preferred condition for wildlife. Recently, the FAA has approved several Audio-Visual Warning Systems (AVWS) for wind farm use. Radar units at the wind farm perimeter track nearby aircraft, and switch on the lights only when an aircraft appears to be on a collision course with

the wind turbines, and also broadcast a radio warning to pilots. When the danger has passed, the lights are switched off. Such a system not only further reduces bird losses to turbine collision, but also preserves “dark sky” values for nearby natural areas, wildlife areas, and State Parks.

Recommendation #57: The County may wish to consider a requirement to install an Audio-Visual Warning System to reduce the frequency and duration of wind farm illumination.

Tubercled Orchid, *Platanthera flava* var. *herbiola*. This yellow-to-green-flowered orchid is typically found in moist meadows, wet prairies, and along the edges of ponds, lakes, and rivers characterized by sandy soils. These conditions are met at a number of locations within the GRSFWA, where several populations exist. This plant is pollinated by mosquitoes and pyralid moths, and perhaps other insects as well. It is distinguished from similar orchids by a prominent bump (tubercle) on the lower flower petal, which is thought to force entering insects to come into contact with pollen-bearing anthers.

T76, south of GRSFWA, may be capable of casting flicker shadows on Orchid habitats, but only on winter mornings, when neither the Orchid nor its pollinating insects are active. Noise and vibration will not exert a direct effect on the Orchid itself and, while mosquitoes have some sensitivity to particular sound frequencies (sonic repellents are sold commercially), those frequencies, which attenuate rapidly over short distances, are not known to be produced by utility-scale wind turbines.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the essential habitat of the Tubercled Orchid.

Broom Rape, *Orobanche ludoviciana*. This small purple-flowering plant has no chlorophyll and is unable to derive energy from photosynthesis. Consequently it survives as a parasite. Germinating seeds must quickly entwine their roots with those of a suitable host plant whose energy is tapped to support growth and reproduction. Not all plants make suitable hosts. All Broom Rape plants documented from Lee County are parasitic on Prairie Golden Aster, *Heterotheca camporum*, a plant common on dry sand prairies. At GRSFWA, some populations of Broom Rape number in the thousands and appear secure. This plant is visible above-ground only in its flowering stage, in the fall, and its dried flower-stalks may remain visible into spring.

The plant is insect-pollinated, which raises the possibility that a specific insect restricted to prairie environments may be involved. The host plant, Prairie Golden Aster, is pollinated by bees and flies. Broomrape seeds are produced from small capsules; dispersal mechanisms are unknown, but seeds can lie dormant in the soil for many years. Germination may be triggered by chemicals exuded by the roots of suitable host plants.

Populations within GRSFWA are remote from proposed wind turbines and should not be adversely affected, but it is possible that unidentified populations persist in suitable habitats throughout the project area which have not been botanically surveyed. Because plants are regarded as the property of the land-owner, only the written permission of the land-owner is required to avoid criminal liability for “taking” listed plants.¹⁰ Where lease areas are occupied by Prairie Golden Aster, the developer should consider obtaining written permission to take Broom Rape prior to any disturbance since, depending on timing; surveys for Broom Rape may not be conclusive. Avoidance of disturbance to such habitats is preferred.

¹⁰ 520 ILCS 10/3(3)

The applicant has indicated that all construction activities are planned to occur only in tilled agricultural areas. However, aster seeds are wind-borne, so it is possible that if native vegetation is allowed to grow adjacent to wind turbine access roads, transformers, or the turbines themselves, dormant Broom Rape seeds from long ago could be activated.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the essential habitat of Broom Rape.

Dwarf Grape Fern, *Botrychium simplex*. This diminutive endangered fern is a relict species of the boreal forest, having only three documented populations in Illinois. This population is located in the East Grove INAI Site, where it is sheltered in a forested ravine on private property. However, efforts over the past decade to relocate this hard-to-spot plant have been unsuccessful.

A relatively primitive plant reproducing by spores, it may have no important relationships with particular classes of animals. Consequently, there is far less potential for indirect adverse effects related to the construction and operation of wind turbines.

It is the biological opinion of the Department the proposed action is unlikely to adversely affect the essential habitat of the Dwarf Grape Fern.

Daisy-Leaf Grape Fern, *Botrychium matricariifolium*. A bit larger than the Dwarf Grape-Fern, this is another endangered boreal forest relict species which is extremely rare in Illinois, having only four known populations. Growing up to a foot tall, it is still easily missed among other plants. This Fern is found inside the GRSFWA in a brushy area northeast of Davin's Pond. Reproducing by spores, it has no known important association with animals as pollinators, herbivores, or parasites.

It is the biological opinion of the Department the proposed action is unlikely to adversely affect the essential habitat of the Daisy-Leaf Grape Fern.

Consultation on the part of the Department is terminated, unless Lee County desires additional information or advice related to this proposal. In accordance with 17 Ill. Adm. Code 1075.40(h), the County must notify the Department of its decision regarding these recommendations, whether it will:

- Proceed with the action as originally proposed;
- Require the action to be modified per Department recommendations (please specify which measures if not all will be required); or
- Forgo the action.

This consultation is valid for two years unless new information becomes available which was not previously considered; or the proposed action is modified; or additional species, essential habitats, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for

environmental assessments. If additional protected resources are encountered during the project's implementation, the applicant must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action. Please contact me if you have questions regarding this review.

Sincerely,

A handwritten signature in black ink that reads "Keith M. Shank". The signature is written in a cursive style with a stylized "K" and "S".

Keith M. Shank
Impact Assessment Section
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(217) 785-5500

cc: Jenny Skufca, Illinois Nature Preserves Commission
John Martin, Green River Wind Farm Phase I LLC